

## CALIFORNIA'S INSPECTION AND MAINTENANCE PROGRAM

### PERIODIC INSPECTION FOR VEHICULAR EMISSION REDUCTION

California employs several strategies to reduce emissions from on-road motor vehicles. In order to ensure that emissions remain low throughout the life of the vehicle, a two pronged approach is utilized.

While warranty requires vehicle manufacturers to build durable emission control components and systems, the Inspection and Maintenance Program or "Smog Check" requires vehicle owners to do their part.

Periodic emissions inspection began in California in the early 1970s. At that time change of ownership inspections were required at privately-owned service stations and garages known as "Blue Shield Stations."

In 1973, the state began testing vehicles for exhaust emissions of HC, CO and NO<sub>x</sub>, at state owned and operated centralized test facilities located in Riverside County. The program was known as the "Mandatory Vehicle Emissions Inspection and Testing" Program or **MVIP**.

Phase II of the program extended the change of ownership inspection requirement to all of the South Coast Air Basin. The state contracted with Hamilton Test Systems and established 17 test stations.

Objections to the driving distances and waiting times associated with the centralized facilities, as well as the "ping pong" between testing and repair facilities, eventually led to the closing of the Hamilton stations.

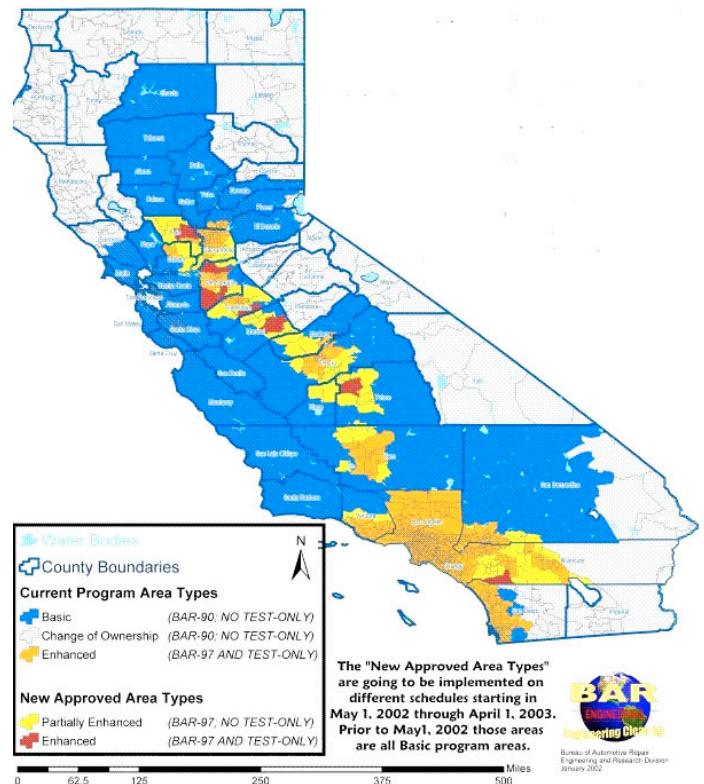
By 1984, the Smog Check Program had spread beyond the South Coast Air Basin and testing was performed by a decentralized network of independently owned stations. Vehicles were tested at idle for HC and CO. Although NO<sub>x</sub> was not measured, visual and functional tests of the exhaust gas recirculation system (EGR), engine timing and catalytic converter were required to ensure that NO<sub>x</sub> emissions were being controlled.

Significant changes to the program were enacted in 1990 and again in 1997 increasing the stringency of the program, increasing the cost limits for inspection and repair and requiring stations in the smoggiest areas to again test for NO<sub>x</sub>. Testing for NO<sub>x</sub> required the use of dynamometers and a loaded mode test, the **Acceleration Simulation Mode or ASM** test.

The Bureau of Automotive Repair (BAR) established a hierarchy of test stations to carry out the new test requirements.

**Test Only Stations** are prohibited from performing re-

California's Current and New Smog Check Areas



pair services. These stations were established to address the concerns of the U.S. EPA regarding conflict of interest. At that time, EPA claimed that the best decentralized program could only achieve 50% of the benefit of a centralized program.

**Test and Repair Stations** can perform both test and repair but cannot certify "Gross Polluters", the highest emitting vehicles in the fleet.

**Gross Polluter Certification stations** are authorized to both test and repair gross polluters.

**Gold Shield Guaranteed Repair Stations** warrant their emission related repairs for 10 days or 1,000 miles.

In 1995, a joint I/M pilot project was conducted by the staffs of ARB and BAR. The results demonstrated that California's alternative decentralized program was capable of achieving benefits equivalent to the U.S. EPA's "performance standard." BAR agreed to maintain benefits by sending an increasing percentage of the fleet to test only stations.

# SMOG CHECK—QUICK FACTS (YEAR 2000)

The BAR divides California into four programmatic areas by severity of air quality problems.

**Enhanced Areas:** These areas do not meet federal or state air quality standards for ozone. Vehicles in these areas are subject to biennial inspection and 36% of the fleet must have their inspections at Test-Only stations.

**Partially Enhanced Areas:** These areas were opted into the enhanced program by local air quality agencies. Vehicles in these areas are directed to Test-Only Stations for inspection.

**Basic Areas:** Vehicles in these less smoggy, less populated areas are required to undergo biennial testing at test-and-repair stations.

**Change of Ownership Areas:** Vehicles registered in the more rural areas of the state are only required to be inspected upon change of ownership or when first registered in California.

The need to be able estimate the benefits of the I/M program and its individual elements led to the development of the CALIMFAC model.

CALIMFAC, short for "California I/M Factor", was based on the U.S. EPA's Tech IV emissions inventory model, and was completed in 1998. CALIMFAC was capable of estimating the benefits of the program in place at that time, and allowed users to manipulate several programmatic elements to estimate what the incremental improvements might be.

Among the user specified options were the inspection frequency, test type, the visual and function checks performed, the emissions standard stringency, repair cost limit, mechanic performance, model year exemptions and vehicle class exemptions.

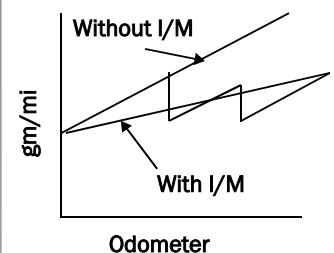
County	Annual Inspections	Failure Rate (%)	Area Designation	Average ASM Inspection Cost	Average Repair Cost
Alameda	470,937	8.20	Basic	\$51.25	\$134.01
Alpine	Not Available	Not Available	Ownership	Not Available	Not Available
Amador	3,993	10.40	Ownership	Not Available	\$106.34
Butte	72,347	9.10	Basic	\$34.70	\$106.87
Calaveras	1,391	10.70	Ownership	Not Available	\$132.56
Colusa	4,936	7.30	Basic	Not Available	\$108.85
Contra Costa	289,725	8.80	Basic	\$50.15	\$146.48
Del Norte	2,235	5.00	Ownership	Not Available	\$111.26
El Dorado	40,978	9.20	Mixed	\$44.37	\$125.00
Fresno	256,839	15.80	Mixed	\$46.74	\$129.05
Glenn	8,228	6.70	Basic	Not Available	\$108.71
Humboldt	14,510	11.00	Ownership	Not Available	\$113.29
Imperial	12,748	4.80	Ownership	\$40.00	\$106.95
Inyo	1,765	14.30	Ownership	Not Available	\$168.70
Kern	187,978	16.20	Mixed	\$51.78	\$136.00
Kings	30,054	13.10	Mixed	\$24.79	\$ 89.15
Lake	5,536	12.00	Ownership	Not Available	\$ 99.79
Lassen	2,413	19.90	Ownership	Not Available	\$115.95
Los Angeles	2,820,120	15.80	Enhanced	\$41.28	\$127.73
Madera	30,149	14.40	Mixed	\$41.08	\$ 80.41
Marin	89,847	6.50	Basic	\$35.81	\$143.66
Mariposa	947	4.00	Ownership	Not Available	\$ 43.38
Mendocino	8,396	16.10	Ownership	Not Available	\$137.08
Merced	60,480	8.30	Mixed	\$46.75	\$ 97.01
Modoc	669	9.70	Ownership	Not Available	\$140.09
Mono	641	10.10	Ownership	Not Available	\$ 35.58
Monterey	112,892	8.90	Basic	\$43.88	\$137.15
Napa	39,481	9.30	Basic	\$32.61	\$129.43
Nevada	31,957	7.00	Basic	\$43.33	\$146.83

Designation	1st Test	Failed	% Failed	Gross Polluters	% Gross
Enhanced	6,789,746	1,036,626	15.3%	327,091	4.8%
Basic	3,691,692	308,718	8.4%	92,518	2.5%
Ownership	88,698	9,142	10.3%	3,292	3.7%
Unknown	3,148	688	21.9%	178	5.7%
<b>Total</b>	<b>10,573,284</b>	<b>1,355,174</b>	<b>12.8%</b>	<b>423,079</b>	<b>4.0%</b>

# SMOG CHECK—QUICK FACTS (YEAR 2000)

County	Annual Inspections	Failure Rate (%)	Area Designation	Average ASM Inspection Cost	Average Repair Cost
Orange	903,018	13.60	Enhanced	\$45.13	\$146.39
Placer	122,615	11.50	Mixed	\$56.09	\$149.87
Plumas	2,069	10.40	Ownership	\$50.00	\$141.06
Riverside	439,773	13.20	Mixed	\$48.97	\$149.56
Sacramento	442,265	16.00	Mixed	\$47.50	\$158.11
San Benito	12,085	7.90	Basic	Not Available	\$153.59
San Bernardino	494,953	14.70	Mixed	\$45.36	\$126.17
San Diego	960,042	14.70	Mixed	\$44.93	\$152.78
San Francisco	172,628	9.30	Basic	\$66.83	\$137.05
San Joaquin	178,056	15.40	Mixed	\$55.64	\$141.49
San Luis Obispo	84,431	9.40	Basic	\$47.11	\$117.34
San Mateo	228,925	6.50	Basic	\$65.55	\$149.44
Santa Barbara	130,524	9.60	Basic	\$46.48	\$ 84.98
Santa Clara	591,017	5.40	Basic	\$58.51	\$124.93
Santa Cruz	89,570	7.60	Basic	\$38.83	\$125.90
Shasta	65,210	10.10	Basic	\$46.55	\$ 99.90
Sierra	Not Available	Not Available	Ownership	Not Available	Not Available
Siskiyou	4,082	20.40	Ownership	Not Available	\$117.49
Solano	130,114	12.50	Mixed	\$54.42	\$153.36
Sonoma	153,951	8.30	Mixed	\$44.31	\$138.99
Stanislaus	162,311	14.70	Mixed	\$42.28	\$130.01
Sutter	29,319	9.20	Basic	\$26.63	\$ 97.88
Tehama	17,071	12.30	Basic	\$26.74	\$ 71.33
Trinity	644	24.40	Ownership	Not Available	\$ 51.55
Tulare	97,881	16.00	Mixed	\$40.82	\$ 90.55
Tuolumne	4,391	16.30	Ownership	Not Available	\$ 93.83
Ventura	254,386	12.60	Mixed	\$45.12	\$153.13
Yolo	51,962	12.80	Mixed	\$55.39	\$138.98
Yuba	Not Available	Not Available	Basic	Not Available	Not Available
<b>Statewide</b>	<b>10,441,518</b>	<b>13.0</b>		<b>\$44.65</b>	<b>\$134.73</b>

The benefits of I/M are essentially modeled as a "sawtooth". Emissions are assumed to increase linearly in the absence of I/M. When vehicles undergo the program, a percentage of the fleet is assumed to fail, are identified and repaired, causing a decrease in emissions after which emissions were assumed to increase as before.



The failure rates and the affects of repair used in CALIM-FAC were based on empirical data collected during the performance of the I/M evaluation projects.

In these test programs, randomly selected vehicle due for inspection were first **FTP** tested in the state's **Haagen-Smit Laboratory** in El Monte. The vehicles were then sent to randomly selected Smog Check stations. The resulting repairs and the change in emission rates were verified by retesting each vehicle in the lab after the Smog Check.

The assumed benefits of I/M are updated periodically using data collected in the vehicle surveillance programs. In these programs, ARB acts as a test and repair station according to BAR guidelines.

In 1991, a contract was let by the ARB to update and expand the capabilities of the CALIM-FAC model. Because many of CALIMFAC's operations were redundant to those of EMFAC, the models were eventually integrated into what was later called the EMFAC 2000 model.

	Gross Polluter	Tailpipe	Visual	Functional	Overall
<b>Fail</b>	423,079	1,005,023	266,657	690,688	1,335,174
<b>% Fleet / % Fail</b>	4.0% / 32%	9.5% / 75%	2.5% / 20.0%	6.5% / 52%	12.8% / 100%